



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: A Multiple Study Of Vernal Pools: From Leaf Litter To Landscape Level

Duration: 09/01/97 - 8/31/98

Federal Funds: \$20,160

Non-federal Funds: \$40,343

Principal investigator's names and university:

Charlotte Pyle, Ph.D., University of Connecticut, Eileen Jokinen, Ph.D., University of Connecticut

Congressional District of University where the research is to be conducted: Second

Statement of critical regional or state water problems:

Although the importance of vernal pools in the northeast has been recognized recently by some states (e.g. Connecticut and Massachusetts), there is still little definitive information about vernal pool habitat quality and its relationship to community structure and the presence of unusual or rare species. One reason that it has been difficult to characterize good vernal pool habitat may be related to the fact that individual pools are quite variable both in habitat conditions they provide at the pool scale and with regard to habitat conditions measured at broader spatial and temporal scales. We will examine ecological functioning within vernal pools and the relationships between (A) the within-pool characteristics, the pool fringe vegetation, and the characteristics of the broader landscape, (B) the structure of the whole faunal community, and (c) the presence of indicator organisms (fairy shrimp, wood frogs, and salamander egg masses and larvae).

Statement of results or benefits:

Today's rapidly changing landscapes, it is crucial not to lose areas rich in species or functional diversity. Landscapes which contain vernal pool habitat are likely to be richer in the overall diversity of species, unusual ecological processes and species adaptations, and ecological connections between pool residents and non-residents.

Vernal pools are a unique habitat that is at risk for several reasons. Although they are currently being recognized in some states (Connecticut and Massachusetts) under wetland regulations, vernal pools are likely to be overlooked because they are small (generally less than 30 meters in diameter), difficult to recognize during the dry season (if one is not aware of the habitat type), and likely to occur outside of areas typically recognized as wetland habitat (e.g., they are found in forests or agricultural lands often far from a floodplain or swamp).

A multi-scale study of vernal pools is timely for several reasons. Besides being the site of unusual ecological processes (some of which are not well-documented), vernal pools are considered required (or critical) breeding habitat for certain obligate species of amphibians and invertebrates, some of which also are threatened or of special concern (Table 1). During each year, the amphibians must have suitable habitat in both the pools and in nearby terrestrial sites if they are to continue reproducing successfully. It is currently not clear what habitat components are most important for maintaining the presence of species which use both pools and adjacent terrestrial habitat.

This project involves an interdisciplinary approach that integrates data gathered at multiple scales to study (1) how vernal pools function as small ecosystems (a) with regard to habitat quality [physical and chemical characteristics within the pools] and (b) with regard to the decomposition of the organic matter which provides the main energy source of the pools, and (2) how the pools are functionally connected to the surrounding site (through receiving inputs of organic matter and providing habitat for amphibians that breed in the pools but otherwise live in the surrounding landscape).

The inclusion of the landscape-level habitat context is significant. Spatial and functional relationships of adjacent and disjunct habitat patches are an increasingly important consideration in understanding how landscape patterns affect processes that include more than one type of habitat in a landscape. These issues have only recently begun to receive attention in the context of wetland habitat (Laan and Verboom 1990; Stone 1992).

It is anticipated that this study of the relationships between the structure of vernal pool communities (with those species dependent upon vernal pools) and the multiple scales of habitat factors will serve to identify suitable testable hypotheses for modeling of vernal pool habitat characteristics (chemical, physical particularly in combination with a study on the use of remote sensing methods for vernal pool location and biological) along with their potential to hold highly diverse communities and serve as breeding and/or living areas for dependent species. Results will be useful in designating broadscale conservation efforts, particularly in combination with a study on the use of remote sensing methods for vernal pool location.